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(71) Applicant *(for all designated States except US)*: TDS CAD GRAPHICS LIMITED [GB/GB]; Lower Philips Road, Blackburn BB1 5TH (GB).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: OAKLEY, Andrew, Robert [GB/GB]; 144 Revidge Road, Blackburn BB2 6EB (GB). JOSCELYNE, Ian, Spencer [GB/GB]; 11 Ribble House, Sarmation Fold, Ribchester, Preston PR3 3YG (GB). UNSWORTH, Peter [GB/GB]; Patchwork Cottage, 5 Mount Pleasant, Townend, Slaidburn BB7 3EP (GB).

(74) Agents: NEIL, Alastair, William et al.; Appleyard Lees, 15 Clare Road, Halifax (GB).

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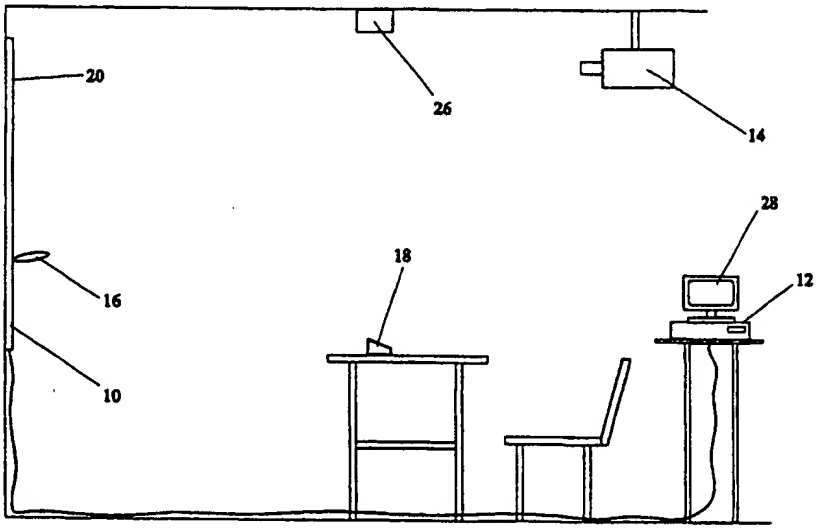

(57) Abstract

An interactive display system comprises a white board (10) which communicates with a PC (12). A projector (14) receives signals from the PC (12) which are translated into corresponding projection image which is projected on to the white board (10). The image projected on to the white board (10) is the same as that shown on a computer screen (28). By using an electronic pen (16) the position of which can be detected electronically by means of a plurality of wires embedded beneath the surface of the white board (10) and using methods already known in the art, the electronic pen can function in the same way as a computer mouse. The image projected on to the white board (10) may also be manipulated by means of a remote control device (18), which uses infra red communication to transmit signals to a transporder (20) built within the white board (10).

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INTERACTIVE DISPLAY SYSTEM

This invention relates to an interactive display system, particularly, but not limited to an interactive display system which includes a remote signalling device.

Existing interactive displays make use of an electronic whiteboard which can sense the position of an electronic pen on the surface of the whiteboard. When a computer display is projected onto the whiteboard and its position calibrated, the electronic pen can be used in the same way as a computer mouse to manipulate objects on the computer display by passing the electronic pen over the surface of the whiteboard. This type of interactive whiteboard enables the teacher to manipulate and annotate material rapidly as a result of audience questions. The use of interactive whiteboards improves teaching productivity and also improves student comprehension. Such whiteboards allow use to be made of good quality digital teaching materials, and allow data to be manipulated and presented using audio visual technologies.

Problems arise with these existing interactive whiteboards in that it is difficult to assess a student's comprehension of the material. Also, the systems require a cumbersome amount of wiring between the various parts of the system.

It is an object of the present invention to address to above mentioned disadvantages.

According to a first aspect of the present invention an interactive display system comprises a display device, an image projector, computing means and at least one remote signalling device, in which the computing means is arranged to supply image information to the projector, which is arranged to project said image information onto the display device; and in which the or each remote signalling device is operable to transmit signals to a receiver portion of the display device, the display device being arranged to supply the signals to the computing means, said signals being stored by the computing means for display.

The display means is preferably a communications hub of the display system arranged to receive control signals from a pointing device and/or a remote control device and transmit those signals to the computing means in order to control the image projected onto the display means. In preferred embodiments the display means uses a single communications link between it and the computing means which is capable of conveying signals both from the pointing device and the or each remote signalling device, to enable a most efficient transfer of data. Preferably this single link is a wireless connection such as infra-red means or radio means.

The or each remote signalling device, may be a remote control device which is operable to transmit control signals to a receiver portion of the display device, which control signals are supplied to the computing means and are operable to control the computing means and thus image information supplied to the projector.

The display device may include a wireless transmitter portion, preferably integral with the receiver portion.

The display device may include position indication means for indicating the position of a pointing device relative to a surface of the display device.

The interactive display system may be operable to calibrate the location of an image projected onto the display device relative to the display device. The pointing device may be operable to effect the calibration.

The pointing device may be operable to induce image control signals in the position indication means, which image control signals are operable to control the computing means and thus image information projected onto the display means. Alternatively, pressure exerted by the pointing device on the display means may induce control signals in the

position indication means. A further alternative is that the pointing device may include a laser, the position of light from which on the display means is used to cause control signals in the position indication means to be generated.

The pointing device may be arranged to take precedence over the or each remote signalling device, with signals from the or each remote signalling device being ignored if signals from the pointing device are being received.

The pointing device may be operable to selectively enable the or each remote signalling device, preferably by signals supplied via the display means.

The receiver portion of the display device may be located in an upper part thereof, preferably on a front face thereof.

The display device may include an output portion arranged to transmit signals from both the receiver portion and the position indication means to the computing means. The output portion may transmit the signals by wire link or by wireless link. The output portion may be operable to pass signals by wire to a separate wireless transmitter for transmission. Said wireless transmitter portion may be mounted for ease of transmission to the computing means, on a ceiling for instance. The wireless transmitter may also be a wireless receiver, to receive signals from the or each remote signalling device.

The computing means may be a standalone computer, such as a personal computer or may be a networked computer or networked computer server.

The or each remote signalling device may be operable to transmit signals to the receiver portion only in response to a request signal from the display means, preferably from the transmitter portion. Where a plurality of remote signalling devices are provided, the display

means may request information from each remote signalling device in turn, by polling. For instance, by interrogating each remote signalling device in turn to gather data from them sequentially. It will be understood however that other arrangements may be utilised and that the system may allow for simultaneous reception of data from more than one such remote signalling device.

The or each remote control device may be operable to control the computing means in substantially the same manner as a keyboard and mouse combination.

The system preferably comprises one master control device, which may be a remote control device or a pointing device, and a plurality of subsidiary remote signalling devices, in which case the master control device is preferably operable to control display means and computer to selectively activate and deactivate the subsidiary signalling devices.

The subsidiary remote signalling devices may be response devices for responding to information displayed on the display means by a person controlling the master control device.

According to another aspect of the invention an interactive display system comprises a display device, computing means and at least one remote signalling device, in which the computing means is arranged to supply image information to the display device; and in which the or each remote signalling device is operable to transmit signals to a receiver portion of the display device, the display device being arranged to supply the signals to the computing means, said signals being stored by the computing means for display.

According to another aspect of the present invention a method of operating an interactive display system comprises projecting an image of a computer display of a computer onto a display device, receiving signals at a receiver portion of the display device, which signals

are transmitted from at least one remote signalling device, and transmitting those signals to the computer.

The method may include the signals from the or each remote signalling device being independent of the location of the remote signalling device relative to the display means, for instance the signals from the remote signalling device may contain non-position related data.

The signals from the or each remote signalling device are preferably transmitted in response to information displayed on the display device.

According to a further aspect of the present invention an interactive display device comprises a receiver portion for receiving signals from a remote signalling device, the display device being operable to supply the received signals to a computing means and suitable for displaying an image from a computing means projected onto said display device.

The display device preferably forms a communications hub for an interactive display system.

The invention extends to a remote signalling device for use with the interactive display system described in the first aspect.

All of the features described herein may be combined with any of the above aspects, in any combination.

Specific embodiments of the present invention will now be described by way of example and with reference to the accompanying drawings, in which:

Figure 1 is a schematic view from above of an interactive display system installed in a classroom;

Figure 2 is a schematic side view of the layout in Figure 1;

Figure 3 is a schematic front view of an interactive display device;

Figure 4 is a schematic block diagram of the parts of interactive display device;

Figure 5 is a schematic block diagram of the parts of a feedback device for use with the interactive display system;

Figure 6 is a schematic diagram of the interconnections between the various parts of an interactive display system installation;

Figure 7 is a schematic view from above of a classroom layout for an alternative embodiment of interactive display system; and

Figure 8 is a schematic block diagram of the parts of a remote receiver of a computer/projector portion of the interactive display system.

Referring to Figure 2, an interactive display system comprises a whiteboard 10 which communicates with a PC 12. A projector 14 receives signals from the PC 12 which are translated in to a corresponding projection image which is projected on to the whiteboard 10.

The image projected on to the whiteboard 10 is the same as that shown on a computer screen 28. By using an electronic pen 16, the position of which can be detected electronically by means of a plurality of wires embedded beneath the surface of the

whiteboard 10, and using methods already known in the art, the electronic pen 16 can function in the same way as a computer mouse. Alternatively, the whiteboard may be of the resistive type, in which the presence of a pointing device is detected by pressure causing two layers to contact each other at a particular location, which location is then detected. A further alternative is the use of a laser pen. The position on the whiteboard of a light spot from the pen is calculated by detecting a reflection of the laser light from the whiteboard back to the laser pen by triangulation.

The image projected on to the whiteboard 10 may also be manipulated by means of a remote control device 18, which uses infrared communication to transmit signals to a transponder 20 built into the whiteboard 10. The signals received by the transponder 20 are then relayed to the PC 12, either by a wire link or a wireless link.

Figure 6 shows a typical schematic of the connections between various parts of the interactive display system.

The whiteboard 10 comprises a grid portion 52 which comprises two sets of wire loops arranged orthogonally to each other. An electric signal from the pen 16 induces a current in the wire loops which can be used to determine the position of the pen 16. The infrared transponder 20 is located behind an optical window 24 on an upper part of the front of the whiteboard 10 which allows two way infrared communications. Also, a connector (not shown) is provided on the rear of the whiteboard 10, which connector allows signals to and from the infrared transponder 20 of the whiteboard to be directed to an auxiliary high power and high sensitivity infrared transponder module 26 (see Figure 2) which could be attached to the ceiling of a classroom to provide greater coverage for a large classroom.

The whiteboard 10 is connected to the PC 12 via an RS232 serial port or a USB (universal serial bus) port. The PC 12 may alternatively be a semi-intelligent network device

controlled by a central server system or it could be a local PC, which is stand alone or networked.

Display data from the PC 12 is fed to the projector 14 which can either be freestanding or ceiling mounted. The display, which is normally seen on the monitor 28 of the PC 12 is projected on to the whiteboard 10.

The electronic pen 16 assumes the functionality of the mouse of the PC 12 and allows a presenter to control the computer desktop and any applications run by the PC 12. By using suitable software the pen 16 may be able to function as a keyboard.

Figure 4 is a schematic block diagram of the whiteboard 10. As described above, the whiteboard 10 includes a grid 52 which comprises two sets of wire loops arranged at right angles to each other. A signal processing unit 54 determines the position of the electronic pen 16 on the whiteboard grid 52. An analogue to digital converter 56 converts signals from the signal processing unit 54 into digital information which is passed to a microprocessor 58 which includes flash memory 60. Output from the microprocessor can optionally be put through an RS232 serial port 62 or a USB port 64. Signals from the microprocessor 58 and the signal processing unit 54 are supplied to a control logic unit which passes signals to a wireless communications expansion port 68 which in turn communicates with one of an infrared transponder module, a 418/433 MHz or 868/870 MHz radio module or a 2.4 GHz spread spectrum module, which ever is selected.

Figure 5 shows a schematic block diagram of one of the remote control devices 18. The blocks shown in dashed lines are optional. Each remote control device 18 comprises a microprocessor 36 which is powered by a battery module 32 and power management hardware 34. The battery module 32 has a battery charger circuit 30. The microprocessor 36 includes flash memory 38. The microprocessor 36 may receive input from one or both

of a tablet module 40 or a keypad 42. The remote control device 18 may optionally have an LCD display 44. The microprocessor 36 may receive external signals from an infrared transceiver module 46, a 418/433 MHz or 868/870 MHz radio module 48 or a 2.4 GHz spread spectrum module 50.

The electronics within the whiteboard 10 process the signals from the whiteboard surface and grid portion 52 (see Figure 6) and thus determine the position of the pen and information corresponding to buttons (not shown) pressed on the electronic pen 16. The infrared transponder 20 uses a standardised infrared technology which is commonly available. This facility allows "wireless" connectivity to third party devices using pre-existing software drivers. An alternative would be to use existing radio frequency technology instead of infrared technology.

The remote control device 18 communicates with the transponder 20 of the whiteboard 10 using infrared. The remote control device 18 is suitably for use by a teacher to control the display projected onto the whiteboard 10 in a similar manner to a standard computer mouse or the electronic pen 16 mentioned above. The remote control device 18 may alternatively be used by a student who would be allowed to write on the whiteboard 10 or control applications of the PC 12 projected onto the whiteboard 10 without the student having to leave his seat. When the remote control device 18 is arranged for use by a student, a teacher would typically have control of the electronic pen 16.The pen 16 takes precedence over the remote control device 18 in the situation where signals are supplied to control the whiteboard 10 from the remote control device 18 and the electronic pen 16 simultaneously.

In addition to or as a replacement for the remote control device 18 the display system may comprise a plurality of student remote control units 18. In this case access to control the display on the whiteboard 10 can be controlled by a teacher having a master remote control device 18 or by using the electronic pen 16. The control of precedence of signals from the

electronic pen 16 over those from one or more of the remote control devices 18 is effected by suitable communication protocols.

The remote control devices 18 may take the form of a keypad unit or a display device or a combination of the two.

When a plurality of remote control devices 18 are used a teacher may pose questions which are displayed on the whiteboard 10, which are answered by students having one of the remote control devices 18. In order to obtain the students' answers, the whiteboard 10 transmits a request from the transponder 20 to all of the remote control devices 18 in turn. The request includes an address and a type code for a particular device with which it wishes to communicate. The relevant device having the specified address will then transmit a response given by a student (and stored in memory) back to the whiteboard 10. Depending on the type of control device 18 the response data may be positional (ie; to give a location on the whiteboard display), alphanumeric, information on a simple button press on the device (ie; where the student has been asked for a YES/NO answer by pressing one of two buttons) or the response data may be a combination of all three.

For remote control devices 18 which include a display, the transponder 20 on the whiteboard 10 will transmit alphanumeric or graphical information to the device which is to be displayed on the remote control device display.

In a situation where a teacher is setting a student comprehension test, the teacher either requests graphical interaction from a particular student or alternatively, poses a set of questions on the whiteboard 10 and invites alphanumeric responses from the whole class. In the former case, the whiteboard 10 transmits information to a particular remote control device 18 via the transponder 20, which transponder 20 then waits for a response from the chosen remote control device 18. In the latter case the transponder 20 of the whiteboard 10 sends out requests for information from each of the individual remote control devices 18

within the room. These requests are made on a sequential basis with only one remote control device 18 replying at a particular time. This is achieved by each remote control device 18 having a specific device type code and a unique address.

Figure 7 shows an alternative arrangement of the interactive display in which rather than using the serial port 62 or the USB port 64 with a corresponding wire connection shown in Figure 4 between the whiteboard 10 and the PC 12, instructions are sent between the whiteboard 10 and the PC 12 by means of a transponder on the whiteboard 10 which transmits signals to an infrared or radio receiver unit 70 which is connected to the PC 12. In the example shown in Figure 7 the projector and PC are separate units, but the two could be a single integrated unit.

Figure 8 is a schematic block diagram of the receiver unit 70 shown in Figure 7. The receiver unit 70 comprises a microprocessor 72 having flash memory 74. Signals are sent from the microprocessor 72 to the PC via a serial interface 76. Signals are received from the whiteboard 10 via an infrared transceiver module 78 of 418/433 MHz radio module 80 or a 2.4 GHz spread spectrum module 82.

The interactive display system disclosed herein uses a whiteboard as a controller for the computer system. This takes advantage of the fact that a whiteboard is the focus of attention in a classroom, making it well suited to host a response system for student feedback devices. The provision of student feedback devices gives a student the ability to control the whiteboard display without leaving his seat. This includes the capability of freehand drawing and annotation. Data from both the whiteboard and from student responses are fed to the host computer down the same serial communications channel, which minimises wiring infrastructures.

The top of a typical whiteboard is above head height and as a result is an ideal vehicle for mounting an infrared transceiver.

The system gives a teacher the ability to test students for assimilation of material which has just been given to students. This has distinct advantages over previous systems which would require the setting of a test and subsequent marking of the test which introduces undesirable time delays into the teaching process.

The provision of the receiver for the student feedback devices on the whiteboard allows the computer which generates the images to be out of the classroom, perhaps in the form of a larger network computer.

The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this

specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

CLAIMS:

1. An interactive display system comprises a display device, computing means and at least one remote signalling device, in which the computing means is arranged to supply image information to the display device; and in which the or each remote signalling device is operable to transmit signals to a receiver portion of the display device, the display device being arranged to supply the signals to the computing means, said signals being stored by the computing means for display.

2. An interactive display system as claimed in claim 1, in which the display means is a communications hub of the display system arranged to receive control signals from a pointing device and/or a remote control device and arranged to transmit those signals to the computing means in order to control an image on the display means.

3. An interactive display system as claimed in either claim 1 or claim 2, in which the display means uses a single communications link between it and the computing means, which link is capable of conveying signals both from the pointing device and the or each remote signalling device, to enable a most efficient transfer of data.

4. An interactive display system as claimed in claim 3, in which the single link is a wireless connection such as infra red means or radio means.

5. An interactive display system as claimed in any preceding claim, in which the or each remote signalling device is a remote controll device which is operable to transmit control signals to a receiver portion of the display device, which

control signals are supplied to the computing means and are operable to control the computing means and thus image information supplied to the display means.

6. An interactive display system as claimed in any preceding claim, in which the display device includes position indication means for indicating the position of a pointing device relative to a surface of the display device.

7. An interactive display system as claimed in any preceding claim, which is operable to calibrate the location of an image on the display device relative to the display device.

8. An interactive display system as claimed in any preceding claim, in which the pointing device is operable to induce image control signals in the position indication means, which image control signals are operable to control the computing means and thus image information is displayed on the display means.

9. An interactive display system as claimed in any preceding claim, in which the pointing device is arranged to take precedence over the or each remote signalling device.

10. An interactive display system as claimed in any preceding claim, in which the pointing is operable to selectively enable the or each remote signalling device.

11. An interactive display system as claimed in any preceding claim, in which the display device includes an output portion arranged to transmit signals from both the receiver portion and the position indication means to the computing means.

12. An interactive display system as claimed in any preceding claim, in which the or each remote signalling device is operable to transmit signals to the receiver portion only in response to a request signal from the display means.

13. An interactive display system as claimed in any preceding claim, in which where a plurality of remote signalling devices are provided, the display means requests information from each remote signalling device in turn, by polling.

14. An interactive display system as claimed in any preceding claim, in which the or each remote control device is operable to control the computing means in substantially the same manner as a key board and mouse combination

15. An interactive display system as claimed in any preceding claim, in which the system comprises one master control device which is a remote control device or a pointing device, and a plurality of subsidiary remote signalling devices.

16. A method of operating an interactive display system comprises projecting an image of a computer display of a computer onto a display device, receiving signals at a receiver portion of the display device, which signals are transmitted from at least one remote signalling device, and transmitting those signals to the computer, to thereby manipulate the image projected onto the display device.

17. A method as claimed in claim 16, which includes the signals from the or each remote signalling device being independent of the location of the remote signalling device relative to the display means.

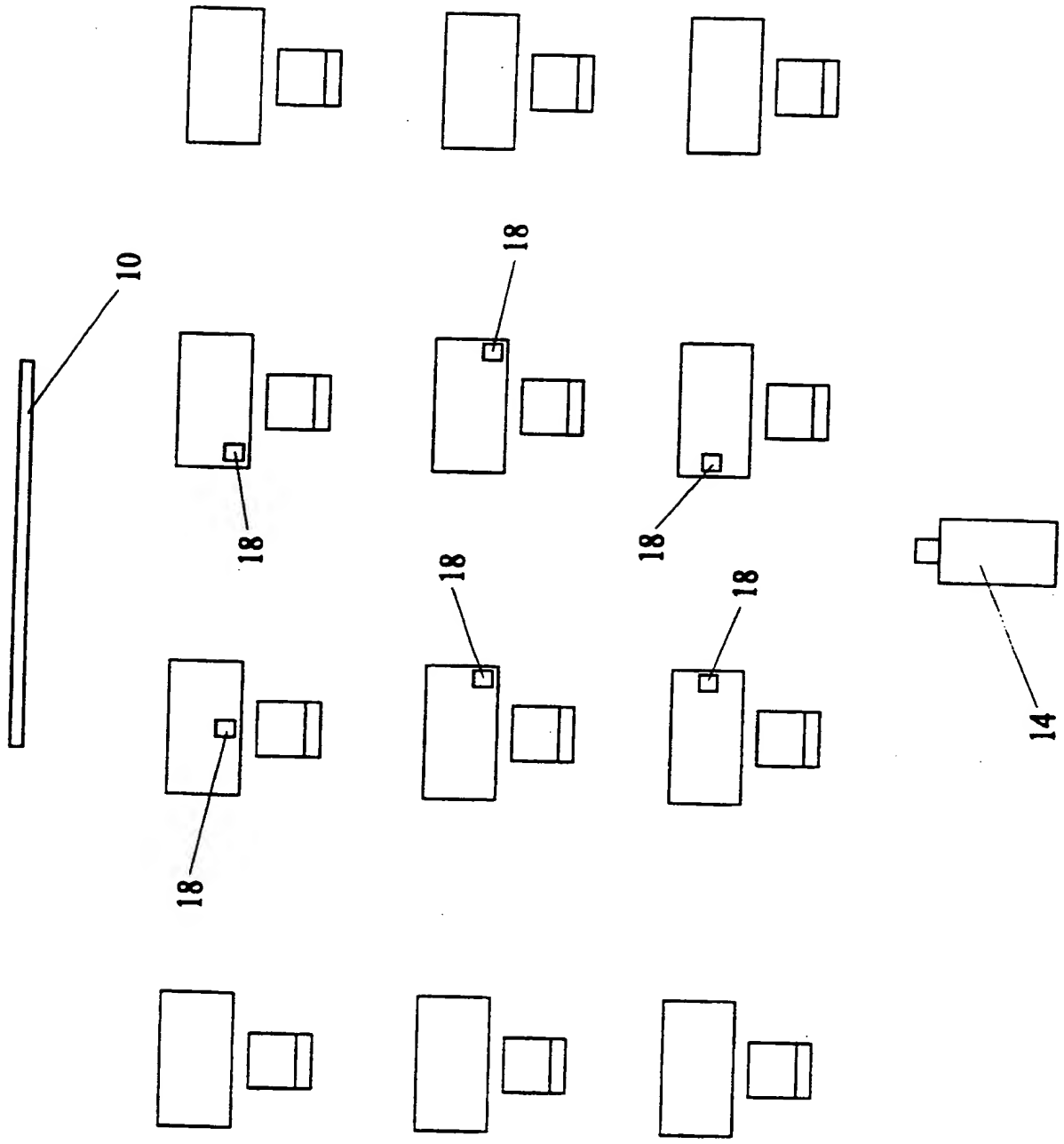
18. A method as claimed in either claim 16 or claim 17, in which the signals from the or each remote signalling device are transmitted in response to information displayed on the display device.

19. An interactive display device comprises a receiver portion for receiving signals from a remote signalling device, the display device being operable to supply the received signals to a computing means and being suitable for displaying an image from a computing means received by said display device.

20. An interactive display device as claimed in claim 19, which preferably forms a communication hub for an interactive display system.

21. A remote signalling device for use with the interactive display system according to any one of claims 1 to 15.

FIG. 1



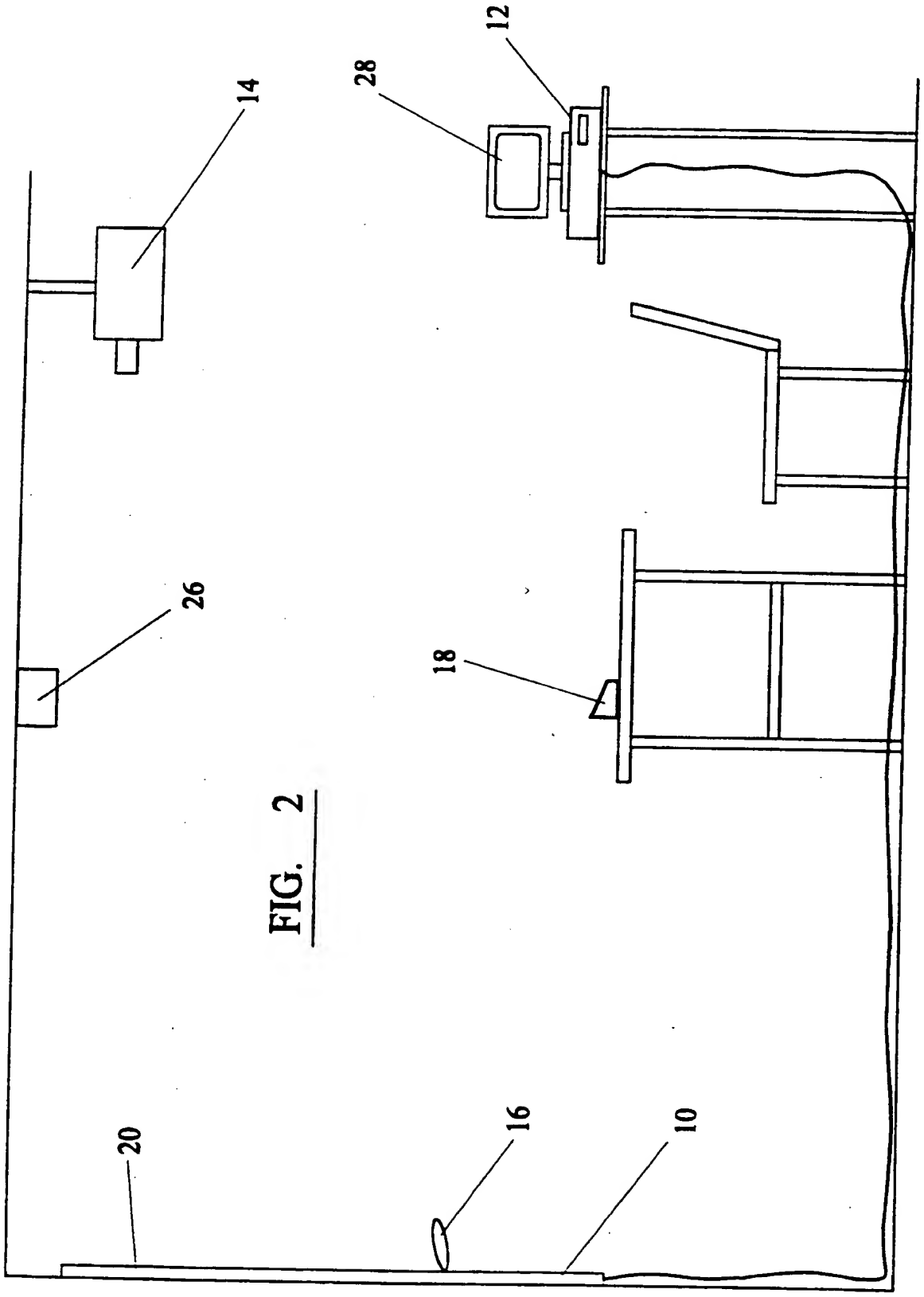


FIG. 2

FIG. 3

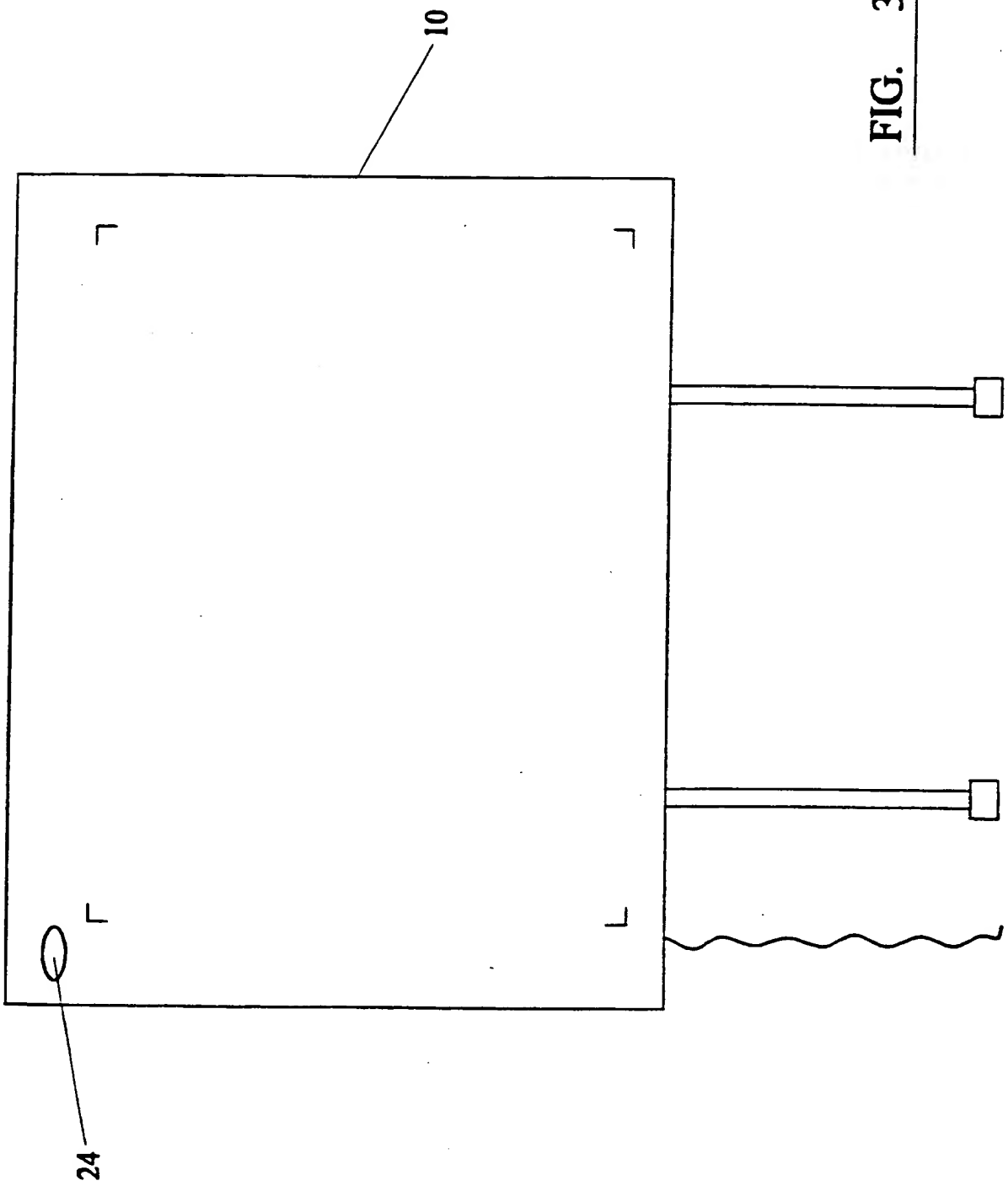
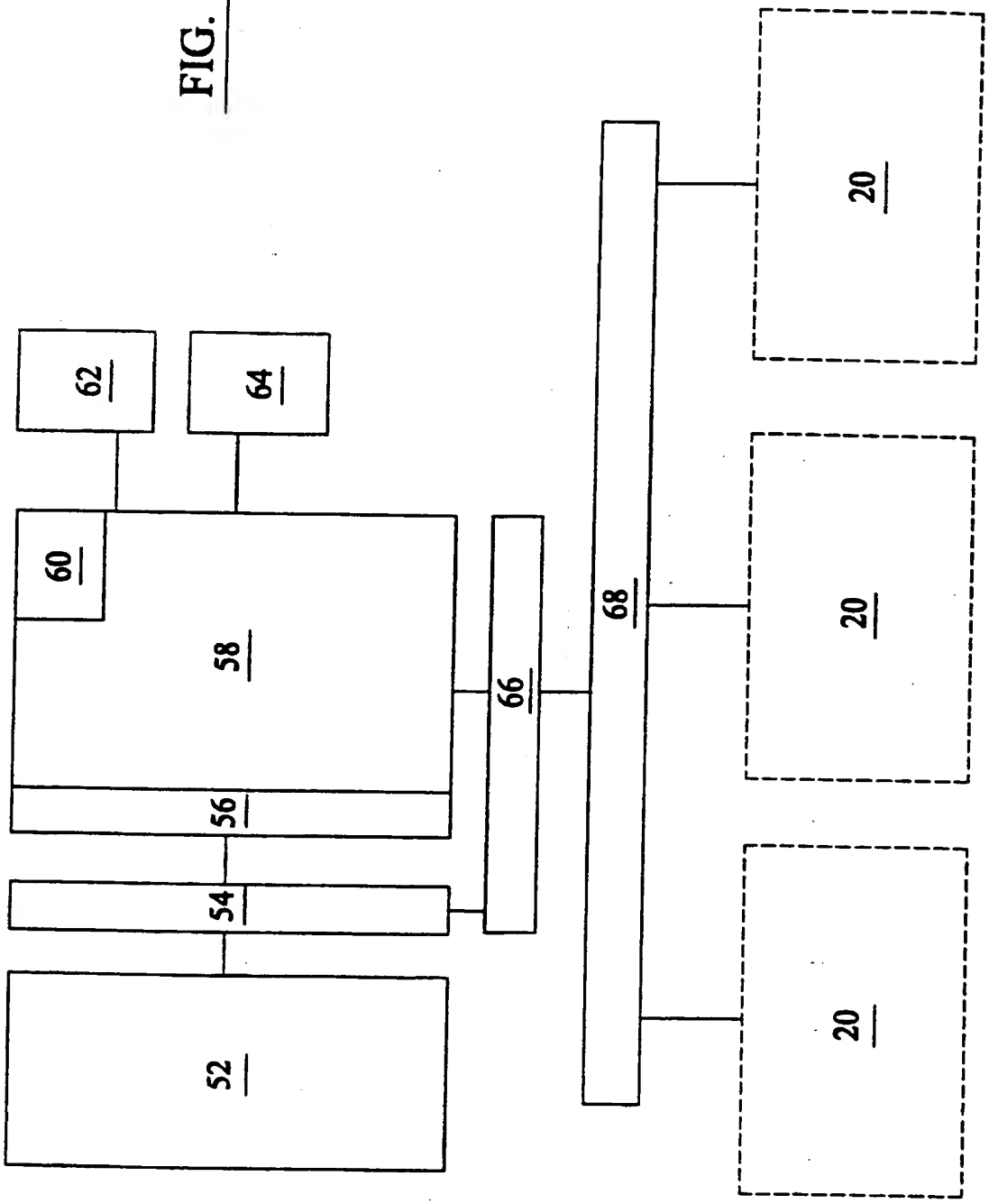


FIG. 4



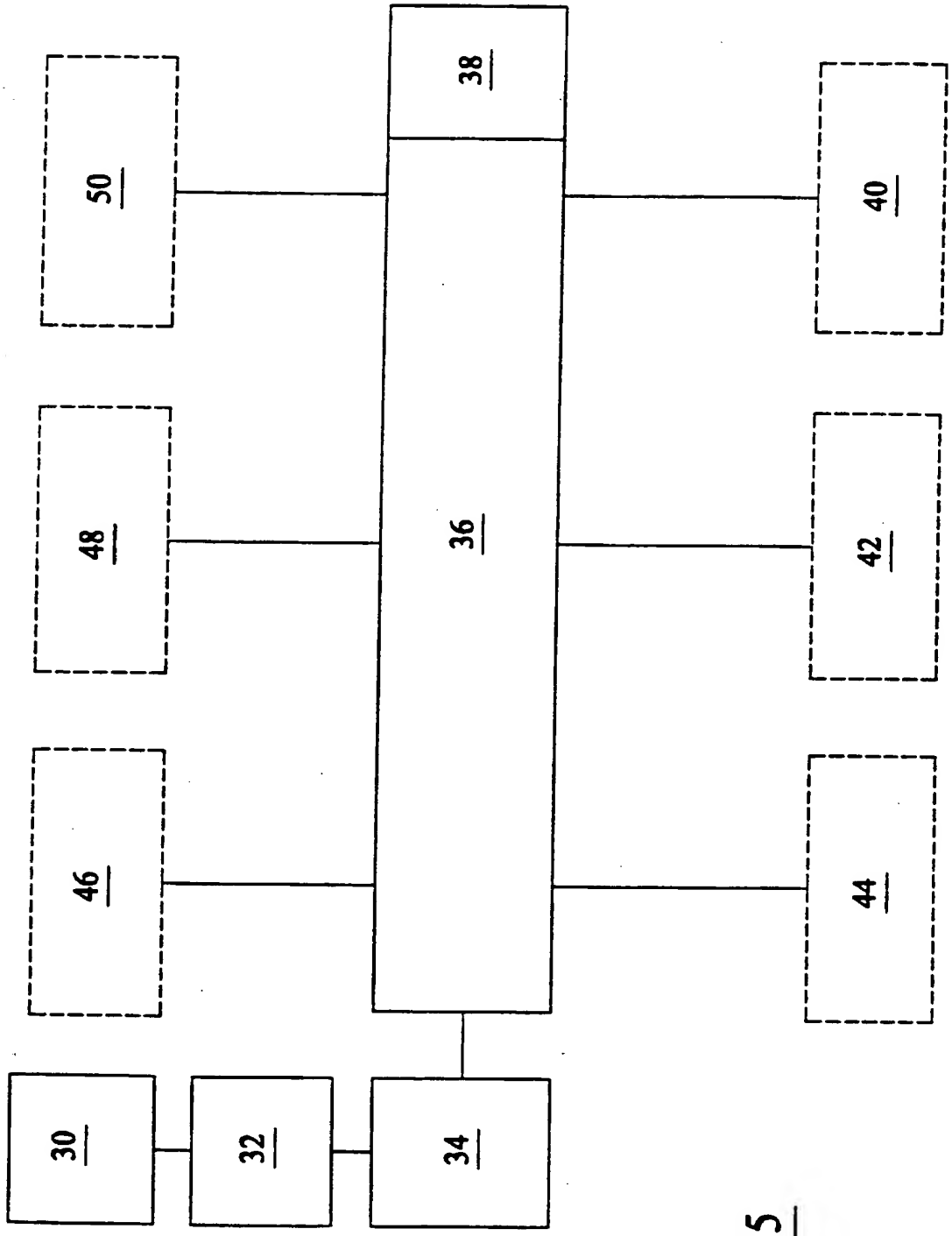


FIG. 5

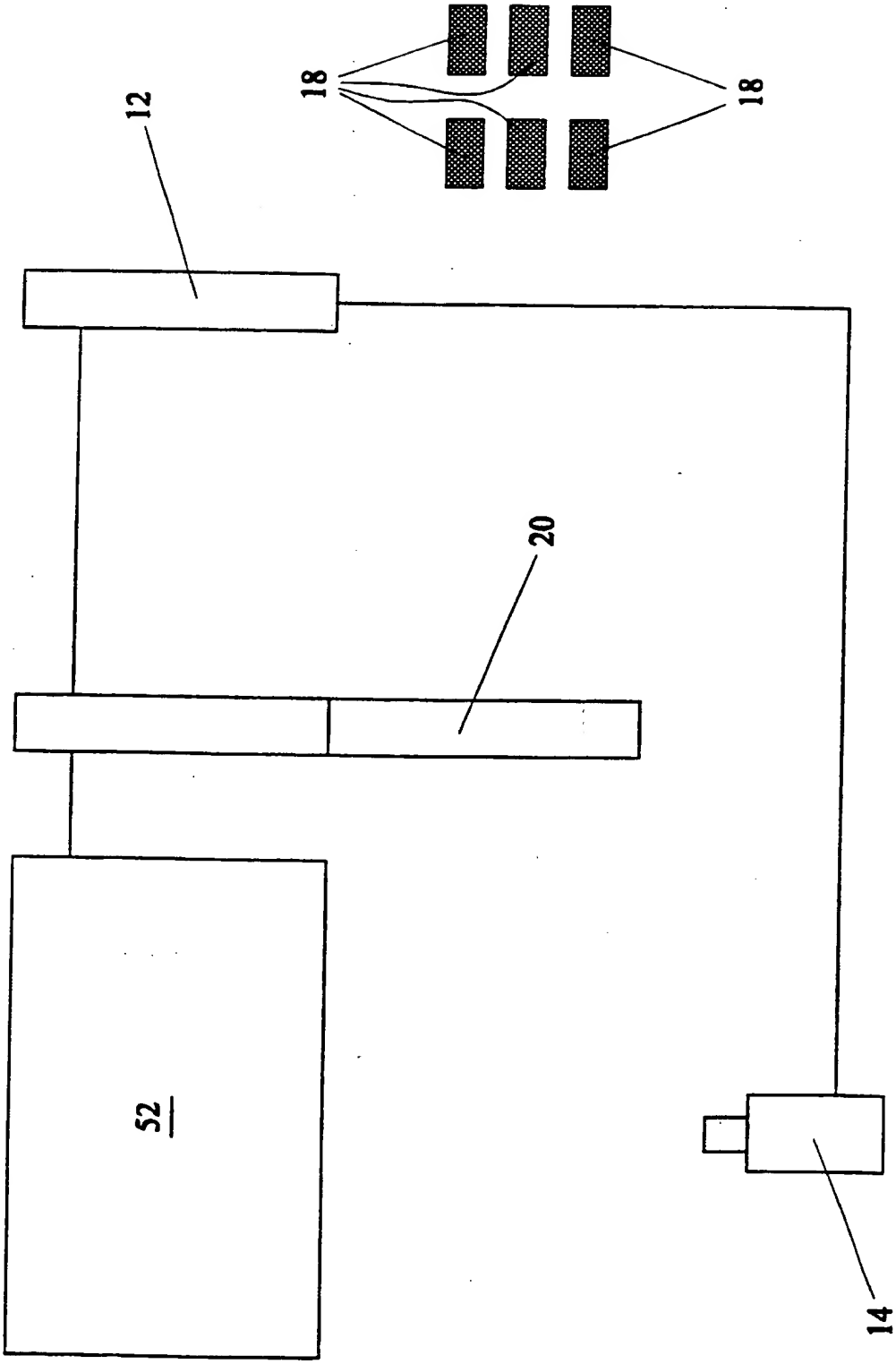
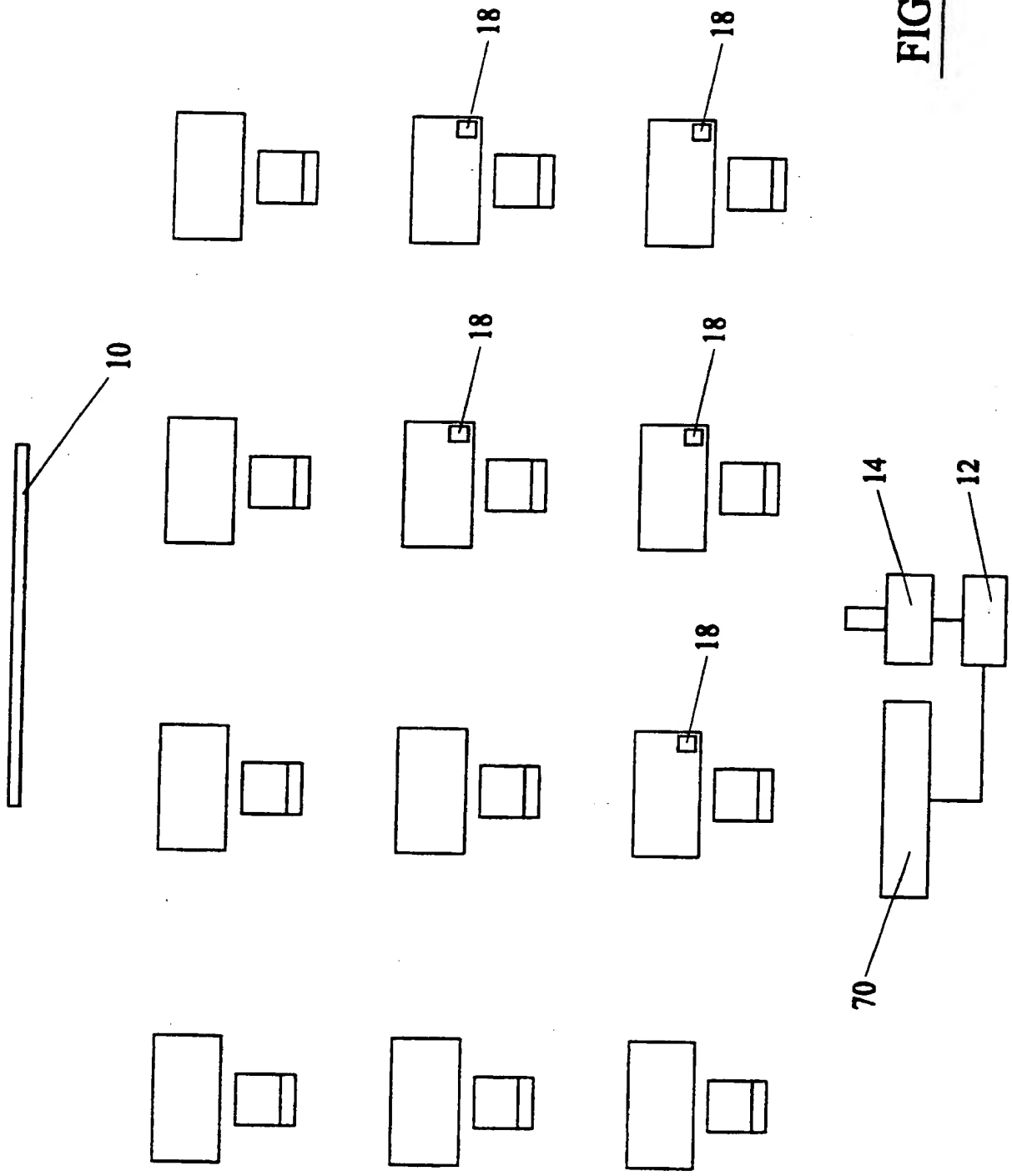


FIG. 6

FIG. 7



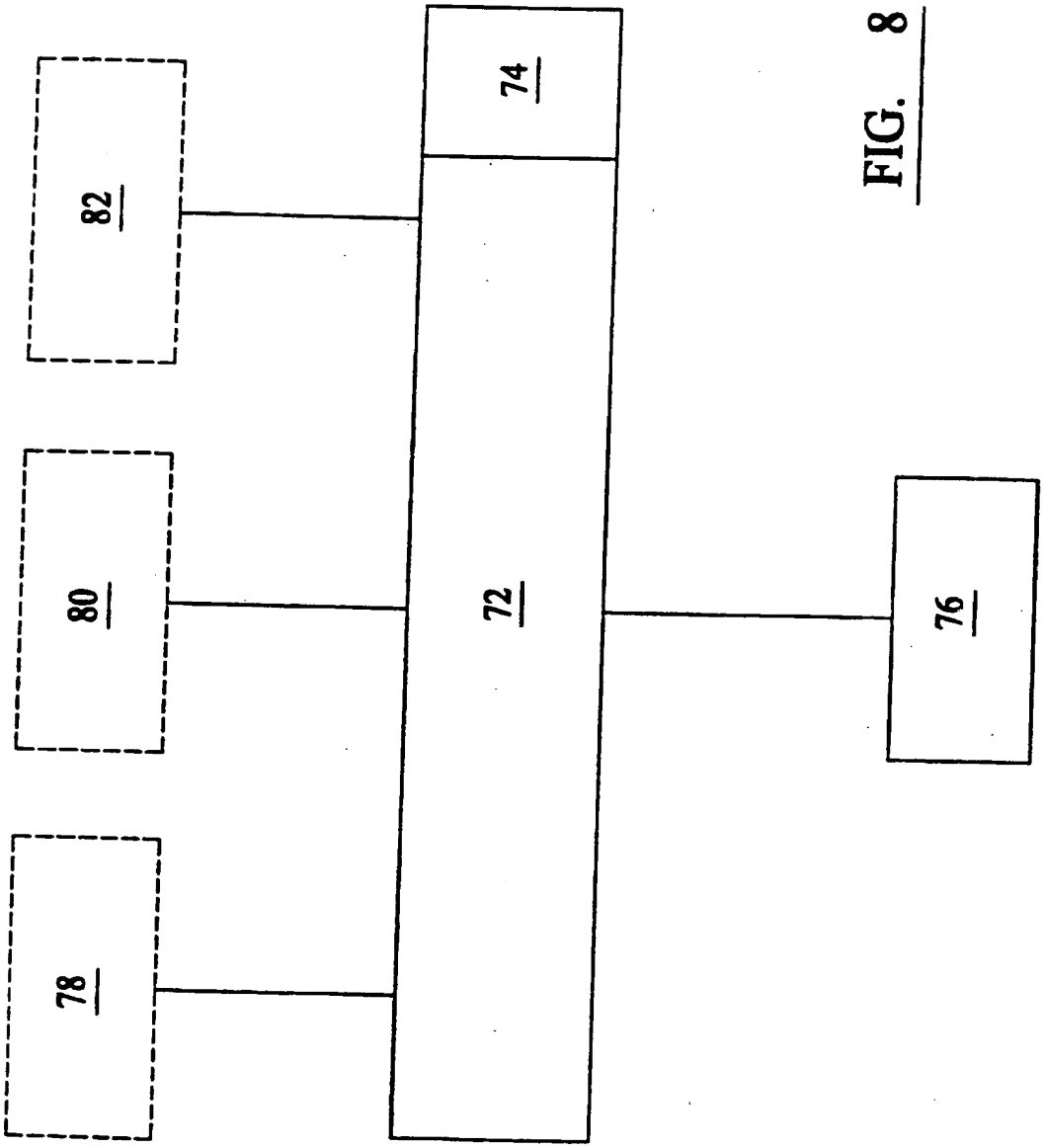


FIG. 8

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/00012

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F3/033 G09B5/06 G09B5/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F G09B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 195 35 119 A (DANDL FRIEDRICH) 27 March 1997 (1997-03-27) column 2, line 26 -column 4, line 21 figure 1	1-6,13, 15-21
A		8-12,14
X	US 5 176 520 A (HAMILTON ERIC R) 5 January 1993 (1993-01-05) column 5, line 1 -column 15, line 11 figure 1	1-3,6, 13,15, 19-21
A		4,8-11, 14,16-18

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 May 2000	05/06/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Baldan, M

2

Form PCT/ISA/210 (second sheet) (July 1992)

Jonal Application No
PCT/GB 00/00012

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 279 558 A (OLIVETTI & CO SPA) 24 August 1988 (1988-08-24) column 1, line 46 -column 2, line 22 column 5, line 55 -column 14, line 22 figure 1	1,19,21
A	———	2,16,20

INTERNA NAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 00/00012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19535119 A	27-03-1997	NONE	
US 5176520 A	05-01-1993	CA 2040614 A	18-10-1991
		DE 69131816 D	05-01-2000
		EP 0479408 A	08-04-1992
EP 0279558 A	24-08-1988	IT 1207347 B	17-05-1989
		DE 3882547 A	02-09-1993

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

NEILL, Alastair W.
APPLEYARD LEES
15 Clare Road
Halifax HX1 2HY
GRANDE BRETAGNE

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing *(day/month/year)*	20.03.2001
Applicant's or agent's file reference RW/LJB/Q860	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB00/00012	05/01/2000	13/01/1999

Applicant
TDS CAD GRAPHICS LIMITED et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/	Authorized officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Muehlbauer, P Tel.+49 89 2399-2513

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
RW/LJB/Q860		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB00/00012	05/01/2000	13/01/1999
International Patent Classification (IPC) or national classification and IPC G06F3/033		
Applicant TDS CAD GRAPHICS LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 9 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
28/07/2000	20.03.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Luberichs, A Telephone No. +49 89 2399 2774

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/00012

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).)*:
Description, pages:

6-13	as originally filed			
1-5	as received on	17/02/2001	with letter of	14/02/2001

Claims, No.:

1-19	as received on	17/02/2001	with letter of	14/02/2001

Drawings, sheets:

1/8-8/8	as originally filed

2. With regard to the **language,** all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☒ the claims, Nos.: 20,21
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-19
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-19
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-19
	No:	Claims	

2. Citations and explanations
   see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re. Item V.

1. Reference is made to the following documents:

   D1: DE 195 35 119 A

   D2: US 5 176 520 A

   D3: EP 0 279 558 A

2. None of the documents cited in the International Search Report contains per se all features of any claim. The subject-matter of all claims is therefore new in the sense of Article 33 (2) PCT.

3. Furthermore, the subject-matter of independent claims 1, 15 and 18 involves an inventive step in the sense of Article 33 (3) PCT.

   Prior art documents D1 to D3 neither disclose nor suggest a remotely controlled interactive display device or system which simultaneously acts as a communications hub for the whole system.

4. Dependent claims 2 to 14, 16, 17 and 19 relate to specific embodiments of the aforementioned independent claims and should therefore meet the requirement of Article 33 (3) PCT, too.

5. Obviously, the subject-matter of all claims is industrially applicable, thus meeting the requirement of Article 33 (4) PCT.

Re. Item VII.

The description is not in conformity with the claims as required by Rule 5.1 (a)(iii) PCT.

Re. Item VIII.

1. Although claims 1 and 18 have been drafted as separate independent apparatus claims, claim 1 is in fact dependent on claim 18, because it contains all features thereof. According to Rule 6.4 (a) PCT this should have been made clear in the dependent claim by a suitable reference (after renumbering) and by stating only the additional features.

   In the present form the aforementioned claims lack conciseness. Moreover, lack of clarity of the claims as a whole arises, since the plurality of independent claims makes it difficult to determine the matter for which protection is sought. Hence, claims 1 and 18 do not meet the requirements of Article 6 PCT.

2. Independent claim 15 cannot be regarded as being a method claim, because it contains a substantial number of structural features rather than method steps. Claim 15 is therefore unclear in the sense of Article 6 PCT, too.

INTERACTIVE DISPLAY SYSTEM

This invention relates to an interactive display system, particularly, but not limited to an interactive display system which includes a remote signalling device.

Existing interactive displays make use of an electronic whiteboard which can sense the position of an electronic pen on the surface of the whiteboard. When a computer display is projected onto the whiteboard and its position calibrated, the electronic pen can be used in the same way as a computer mouse to manipulate objects on the computer display by passing the electronic pen over the surface of the whiteboard. This type of interactive whiteboard enables the teacher to manipulate and annotate material rapidly as a result of audience questions. The use of interactive whiteboards improves teaching productivity and also improves student comprehension. Such whiteboards allow use to be made of good quality digital teaching materials, and allow data to be manipulated and presented using audio visual technologies.

Problems arise with these existing interactive whiteboards in that it is difficult to assess a student's comprehension of the material. Also, the systems require a cumbersome amount of wiring between the various parts of the system.

It is an object of the present invention to address to above mentioned disadvantages.

DE 19535119 discloses an interactive display system in which student feedback devices are hardwired to a teacher's computer, with the computer having a display connected thereto.

US 5176520 discloses an information delivery system having a tutor station and at least one student station, for displaying teacher information from the tutor station on the student station.

EP 279558 comprises a series of student workstations connected to a central teacher workstation which controls the other workstations.

According to a first aspect of the present invention an interactive display system comprises a display device, an image projector, computing means and at least one remote signalling device, in which the computing means is arranged to supply image information to the projector, which is arranged to project said image information onto the display device; in which the or each remote signalling device is operable to transmit signals to a receiver portion of the display device, the display device being arranged to supply the signals to the computing means, said signals being stored by the computing means for display, and the display means is a communications hub of the display system arranged to receive control signals from a pointing device and/or a remote control device and transmit those signals to the computing means in order to control the image projected onto the display means.

In preferred embodiments the display means uses a single communications link between it and the computing means which is capable of conveying signals both from the pointing device and the or each remote signalling device, to enable a most efficient transfer of data. Preferably this single link is a wireless connection such as infra-red means or radio means.

The or each remote signalling device, may be a remote control device which is operable to transmit control signals to a receiver portion of the display device, which control signals are supplied to the computing means and are operable to control the computing means and thus image information supplied to the projector.

The display device may include a wireless transmitter portion, preferably integral with the receiver portion.

The display device may include position indication means for indicating the position of a pointing device relative to a surface of the display device.

The interactive display system may be operable to calibrate the location of an image projected onto the display device relative to the display device. The pointing device may be operable to effect the calibration.

The pointing device may be operable to induce image control signals in the position indication means, which image control signals are operable to control the computing means and thus image information projected onto the display means. Alternatively, pressure exerted by the pointing device on the display means may induce control signals in the position indication means. A further alternative is that the pointing device may include a laser, the position of light from which on the display means is used to cause control signals in the position indication means to be generated.

The pointing device may be arranged to take precedence over the or each remote signalling device, with signals from the or each remote signalling device being ignored if signals from the pointing device are being received.

The pointing device may be operable to selectively enable the or each remote signalling device, preferably by signals supplied via the display means.

The receiver portion of the display device may be located in an upper part thereof, preferably on a front face thereof.

The display device may include an output portion arranged to transmit signals from both the receiver portion and the position indication means to the computing means. The output portion may transmit the signals by wire link or by wireless link. The output portion may be operable to pass signals by wire to a separate wireless transmitter for transmission. Said wireless transmitter portion may be mounted for ease of transmission to the computing means, on a ceiling for instance. The wireless transmitter may also be a wireless receiver, to receive signals from the or each remote signalling device.

The computing means may be a standalone computer, such as a personal computer or may be a networked computer or networked computer server.

The or each remote signalling device may be operable to transmit signals to the receiver portion only in response to a request signal from the display means, preferably from the transmitter portion. Where a plurality of remote signalling devices are provided, the display means may request information from each remote signalling device in turn, by polling. For instance, by interrogating each remote signalling device in turn to gather data from them sequentially. It will be understood however that other arrangements may be utilised and that the system may allow for simultaneous reception of data from more than one such remote signalling device.

The or each remote control device may be operable to control the computing means in substantially the same manner as a keyboard and mouse combination.

The system preferably comprises one master control device, which may be a remote control device or a pointing device, and a plurality of subsidiary remote signalling devices, in which case the master control device is preferably operable to control display means and computer to selectively activate and deactivate the subsidiary signalling devices.

The subsidiary remote signalling devices may be response devices for responding to information displayed on the display means by a person controlling the master control device.

According to another aspect of the invention an interactive display system comprises a display device, computing means and at least one remote signalling device, in which the computing means is arranged to supply image information to the display device; and in which the or each remote signalling device is operable to transmit signals to a receiver portion of the display device, the display device being arranged to supply the signals to the computing means, said signals being stored by the computing means for display.

According to another aspect of the present invention a method of operating an interactive display system comprises projecting an image of a computer display of a computer onto a display device, receiving signals at a receiver portion of the display device, which signals are transmitted from at least one remote signalling device, and transmitting those signals to the computer, and in which the display means is a communications hub of the display system arranged to receive control signals from a pointing device and/or a remote control device and transmit those signals to the computing means in order to control the image projected onto the display means.

The method may include the signals from the or each remote signalling device being independent of the location of the remote signalling device relative to the display means, for instance the signals from the remote signalling device may contain non-position related data.

The signals from the or each remote signalling device are preferably transmitted in response to information displayed on the display device.

According to a further aspect of the present invention an interactive display device comprises a receiver portion for receiving signals from a remote signalling device, the display device being operable to supply the received signals to a computing means and suitable for displaying an image from a computing means projected onto said display device, in which the display device forms a communications hub for an interactive display system.

The invention extends to a remote signalling device for use with the interactive display system described in the first aspect.

All of the features described herein may be combined with any of the above aspects, in any combination.

Specific embodiments of the present invention will now be described by way of example and with reference to the accompanying drawings, in which:

CLAIMS:

1. An interactive display system comprises a display device (10), computing means (12) and at least one remote signalling device (16, 18), in which the computing means (12) is arranged to supply image information to the display device (10); in which the or each remote signalling device (16, 18) is operable to transmit signals to a receiver portion of the display device (10), the display device (10) being arranged to supply the signals to the computing means (12), said signals being stored by the computing means (12) for display, and in which the display means (12) is a communications hub of the display system arranged to receive control signals from a pointing device (16) and/or a remote control device (18) and arranged to transmit those signals to the computing means (12) in order to control an image on the display means (10).

2. An interactive display system as claimed in claim 1, in which the display means (10) uses a single communications link between it and the computing means, which link is capable of conveying signals both from the pointing device (16) and the or each remote signalling device (18), to enable a most efficient transfer of data.

3. An interactive display system as claimed in claim 2, in which the single link is a wireless connection such as infra red means or radio means.

4. An interactive display system as claimed in any preceding claim, in which the or each remote signalling device (16, 18) is a remote control device which is operable to transmit control signals to a receiver portion (20) of the display device (10), which control signals are supplied to the computing means (12) and are operable to control the computing means (12) and thus image information supplied to the display means (10).

5. An interactive display system as claimed in any preceding claim, in which the display device (10) includes position indication means for indicating the position of a pointing device (16) relative to a surface of the display device (10).

6. An interactive display system as claimed in any preceding claim, which is operable to calibrate the location of an image on the display device (10) relative to the display device (10).

7. An interactive display system as claimed in any preceding claim, in which the pointing device (16) is operable to induce image control signals in the position indication means, which image control signals are operable to control the computing means (12) and thus image information is displayed on the display means (10).

8. An interactive display system as claimed in any preceding claim, in which the pointing device (16) is arranged to take precedence over the or each remote signalling device (18).

9. An interactive display system as claimed in any preceding claim, in which the pointing device (16) is operable to selectively enable the or each remote signalling device (18).

10. An interactive display system as claimed in any preceding claim, in which the display device (10) includes an output portion arranged to transmit signals from both the receiver portion (20) and the position indication means to the computing means (12).

11. An interactive display system as claimed in any preceding claim, in which the or each remote signalling device (18) is operable to transmit signals to the receiver portion (20) only in response to a request signal from the display means (10).

12. An interactive display system as claimed in any preceding claim, in which where a plurality of remote signalling devices (18) are provided, the display means (10) requests information from each remote signalling device (18) in turn, by polling.

13. An interactive display system as claimed in any preceding claim, in which the or each remote control device (18) is operable to control the computing means (12) in substantially the same manner as a key board and mouse combination

14. An interactive display system as claimed in any preceding claim, in which the system comprises one master control device which is a remote control device (18) or a pointing device (16), and a plurality of subsidiary remote signalling devices (18).

15. A method of operating an interactive display system comprises projecting an image of a computer display of a computer (12) onto a display device (10), receiving signals at a receiver portion (20) of the display device, which signals are transmitted from at least one remote signalling device (16, 18), and transmitting those signals to the computer (12), to thereby manipulate the image projected onto the display device (10), in which the display means (12) is a communications hub of the display system arranged to receive control signals from a pointing device (16) and/or a remote control device (18) and arranged to transmit those signals to the computing means (12) in order to control an image on the display means (10).

16. A method as claimed in claim 15, which includes the signals from the or each remote signalling device (16, 18) being independent of the location of the remote signalling device (18) relative to the display means (10).

17. A method as claimed in either claim 15 or claim 16, in which the signals from the or each remote signalling device (18) are transmitted in response to information displayed on the display device (10).

18. An interactive display device (10) comprises a receiver portion (20) for receiving signals from a remote signalling device, the display device being operable to supply the received signals to a computing means (12) and being suitable for displaying an image from a computing means (12) received by said display device (10), in which said interactive display device forms a communication hub for an interactive display system.

19. A remote signalling device for use with the interactive display system according to any one of claims 1 to 14.

INTERACTIVE DISPLAY SYSTEM

This invention relates to an interactive display system, particularly, but not limited to an interactive display system which includes a remote signalling device.

Existing interactive displays make use of an electronic whiteboard which can sense the position of an electronic pen on the surface of the whiteboard. When a computer display is projected onto the whiteboard and its position calibrated, the electronic pen can be used in the same way as a computer mouse to manipulate objects on the computer display by passing the electronic pen over the surface of the whiteboard. This type of interactive whiteboard enables the teacher to manipulate and annotate material rapidly as a result of audience questions. The use of interactive whiteboards improves teaching productivity and also improves student comprehension. Such whiteboards allow use to be made of good quality digital teaching materials, and allow data to be manipulated and presented using audio visual technologies.

Problems arise with these existing interactive whiteboards in that it is difficult to assess a student's comprehension of the material. Also, the systems require a cumbersome amount of wiring between the various parts of the system.

It is an object of the present invention to address to above mentioned disadvantages.

According to a first aspect of the present invention an interactive display system comprises a display device, an image projector, computing means and at least one remote signalling device, in which the computing means is arranged to supply image information to the projector, which is arranged to project said image information onto the display device; and in which the or each remote signalling device is operable to transmit signals to a receiver portion of the display device, the display device being arranged to supply the signals to the computing means, said signals being stored by the computing means for display.

The display means is preferably a communications hub of the display system arranged to receive control signals from a pointing device and/or a remote control device and transmit those signals to the computing means in order to control the image projected onto the display means. In preferred embodiments the display means uses a single communications link between it and the computing means which is capable of conveying signals both from the pointing device and the or each remote signalling device, to enable a most efficient transfer of data. Preferably this single link is a wireless connection such as infra-red means or radio means.

The or each remote signalling device, may be a remote control device which is operable to transmit control signals to a receiver portion of the display device, which control signals are supplied to the computing means and are operable to control the computing means and thus image information supplied to the projector.

The display device may include a wireless transmitter portion, preferably integral with the receiver portion.

The display device may include position indication means for indicating the position of a pointing device relative to a surface of the display device.

The interactive display system may be operable to calibrate the location of an image projected onto the display device relative to the display device. The pointing device may be operable to effect the calibration.

The pointing device may be operable to induce image control signals in the position indication means, which image control signals are operable to control the computing means and thus image information projected onto the display means. Alternatively, pressure exerted by the pointing device on the display means may induce control signals in the

position indication means. A further alternative is that the pointing device may include a laser, the position of light from which on the display means is used to cause control signals in the position indication means to be generated.

The pointing device may be arranged to take precedence over the or each remote signalling device, with signals from the or each remote signalling device being ignored if signals from the pointing device are being received.

The pointing device may be operable to selectively enable the or each remote signalling device, preferably by signals supplied via the display means.

The receiver portion of the display device may be located in an upper part thereof, preferably on a front face thereof.

The display device may include an output portion arranged to transmit signals from both the receiver portion and the position indication means to the computing means. The output portion may transmit the signals by wire link or by wireless link. The output portion may be operable to pass signals by wire to a separate wireless transmitter for transmission. Said wireless transmitter portion may be mounted for ease of transmission to the computing means, on a ceiling for instance. The wireless transmitter may also be a wireless receiver, to receive signals from the or each remote signalling device.

The computing means may be a standalone computer, such as a personal computer or may be a networked computer or networked computer server.

The or each remote signalling device may be operable to transmit signals to the receiver portion only in response to a request signal from the display means, preferably from the transmitter portion. Where a plurality of remote signalling devices are provided, the display

means may request information from each remote signalling device in turn, by polling. For instance, by interrogating each remote signalling device in turn to gather data from them sequentially. It will be understood however that other arrangements may be utilised and that the system may allow for simultaneous reception of data from more than one such remote signalling device.

The or each remote control device may be operable to control the computing means in substantially the same manner as a keyboard and mouse combination.

The system preferably comprises one master control device, which may be a remote control device or a pointing device, and a plurality of subsidiary remote signalling devices, in which case the master control device is preferably operable to control display means and computer to selectively activate and deactivate the subsidiary signalling devices.

The subsidiary remote signalling devices may be response devices for responding to information displayed on the display means by a person controlling the master control device.

According to another aspect of the invention an interactive display system comprises a display device, computing means and at least one remote signalling device, in which the computing means is arranged to supply image information to the display device; and in which the or each remote signalling device is operable to transmit signals to a receiver portion of the display device, the display device being arranged to supply the signals to the computing means, said signals being stored by the computing means for display.

According to another aspect of the present invention a method of operating an interactive display system comprises projecting an image of a computer display of a computer onto a display device, receiving signals at a receiver portion of the display device, which signals

are transmitted from at least one remote signalling device, and transmitting those signals to the computer.

The method may include the signals from the or each remote signalling device being independent of the location of the remote signalling device relative to the display means, for instance the signals from the remote signalling device may contain non-position related data.

The signals from the or each remote signalling device are preferably transmitted in response to information displayed on the display device.

According to a further aspect of the present invention an interactive display device comprises a receiver portion for receiving signals from a remote signalling device, the display device being operable to supply the received signals to a computing means and suitable for displaying an image from a computing means projected onto said display device.

The display device preferably forms a communications hub for an interactive display system.

The invention extends to a remote signalling device for use with the interactive display system described in the first aspect.

All of the features described herein may be combined with any of the above aspects, in any combination.

Specific embodiments of the present invention will now be described by way of example and with reference to the accompanying drawings, in which:

CLAIMS:

1. An interactive display system comprises a display device, computing means and at least one remote signalling device, in which the computing means is arranged to supply image information to the display device; and in which the or each remote signalling device is operable to transmit signals to a receiver portion of the display device, the display device being arranged to supply the signals to the computing means, said signals being stored by the computing means for display.

2. An interactive display system as claimed in claim 1, in which the display means is a communications hub of the display system arranged to receive control signals from a pointing device and/or a remote control device and arranged to transmit those signals to the computing means in order to control an image on the display means.

3. An interactive display system as claimed in either claim 1 or claim 2, in which the display means uses a single communications link between it and the computing means, which link is capable of conveying signals both from the pointing device and the or each remote signalling device, to enable a most efficient transfer of data.

4. An interactive display system as claimed in claim 3, in which the single link is a wireless connection such as infra red means or radio means.

5. An interactive display system as claimed in any preceding claim, in which the or each remote signalling device is a remote controll device which is operable to transmit control signals to a receiver portion of the display device, which

control signals are supplied to the computing means and are operable to control the computing means and thus image information supplied to the display means.

6. An interactive display system as claimed in any preceding claim, in which the display device includes position indication means for indicating the position of a pointing device relative to a surface of the display device.

7. An interactive display system as claimed in any preceding claim, which is operable to calibrate the location of an image on the display device relative to the display device.

8. An interactive display system as claimed in any preceding claim, in which the pointing device is operable to induce image control signals in the position indication means, which image control signals are operable to control the computing means and thus image information is displayed on the display means.

9. An interactive display system as claimed in any preceding claim, in which the pointing device is arranged to take precedence over the or each remote signalling device.

10. An interactive display system as claimed in any preceding claim, in which the pointing is operable to selectively enable the or each remote signalling device.

11. An interactive display system as claimed in any preceding claim, in which the display device includes an output portion arranged to transmit signals from both the receiver portion and the position indication means to the computing means.

12. An interactive display system as claimed in any preceding claim, in which the or each remote signalling device is operable to transmit signals to the receiver portion only in response to a request signal from the display means.

13. An interactive display system as claimed in any preceding claim, in which where a plurality of remote signalling devices are provided, the display means requests information from each remote signalling device in turn, by polling.

14. An interactive display system as claimed in any preceding claim, in which the or each remote control device is operable to control the computing means in substantially the same manner as a key board and mouse combination

15. An interactive display system as claimed in any preceding claim, in which the system comprises one master control device which is a remote control device or a pointing device, and a plurality of subsidiary remote signalling devices.

16. A method of operating an interactive display system comprises projecting an image of a computer display of a computer onto a display device, receiving signals at a receiver portion of the display device, which signals are transmitted from at least one remote signalling device, and transmitting those signals to the computer, to thereby manipulate the image projected onto the display device.

17. A method as claimed in claim 16, which includes the signals from the or each remote signalling device being independent of the location of the remote signalling device relative to the display means.

18. A method as claimed in either claim 16 or claim 17, in which the signals from the or each remote signalling device are transmitted in response to information displayed on the display device.

19. An interactive display device comprises a receiver portion for receiving signals from a remote signalling device, the display device being operable to supply the received signals to a computing means and being suitable for displaying an image from a computing means received by said display device.

20. An interactive display device as claimed in claim 19, which preferably forms a communication hub for an interactive display system.

21. A remote signalling device for use with the interactive display system according to any one of claims 1 to 15.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

14

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
RW/LJB/Q860		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB00/00012	05/01/2000	13/01/1999
International Patent Classification (IPC) or national classification and IPC G06F3/033		
Applicant TDS CAD GRAPHICS LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 9 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
28/07/2000	20.03.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Luberichs, A Telephone No. +49 89 2399 2774

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/00012

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).)*:
Description, pages:

6-13	as originally filed			
1-5	as received on	17/02/2001	with letter of	14/02/2001

Claims, No.:

1-19	as received on	17/02/2001	with letter of	14/02/2001

Drawings, sheets:

1/8-8/8	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☒ the claims, Nos.: 20,21
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1-19
	No:	Claims
Inventive step (IS)	Yes:	Claims 1-19
	No:	Claims
Industrial applicability (IA)	Yes:	Claims 1-19
	No:	Claims

2. Citations and explanations
   see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re. Item V.

1. Reference is made to the following documents:

   D1: DE 195 35 119 A

   D2: US 5 176 520 A

   D3: EP 0 279 558 A

2. None of the documents cited in the International Search Report contains per se all features of any claim. The subject-matter of all claims is therefore new in the sense of Article 33 (2) PCT.

3. Furthermore, the subject-matter of independent claims 1, 15 and 18 involves an inventive step in the sense of Article 33 (3) PCT.

   Prior art documents D1 to D3 neither disclose nor suggest a remotely controlled interactive display device or system which simultaneously acts as a communications hub for the whole system.

4. Dependent claims 2 to 14, 16, 17 and 19 relate to specific embodiments of the aforementioned independent claims and should therefore meet the requirement of Article 33 (3) PCT, too.

5. Obviously, the subject-matter of all claims is industrially applicable, thus meeting the requirement of Article 33 (4) PCT.

Re. Item VII.

The description is not in conformity with the claims as required by Rule 5.1 (a)(iii) PCT.

Re. Item VIII.

1. Although claims 1 and 18 have been drafted as separate independent apparatus claims, claim 1 is in fact dependent on claim 18, because it contains all features thereof. According to Rule 6.4 (a) PCT this should have been made clear in the dependent claim by a suitable reference (after renumbering) and by stating only the additional features.

   In the present form the aforementioned claims lack conciseness. Moreover, lack of clarity of the claims as a whole arises, since the plurality of independent claims makes it difficult to determine the matter for which protection is sought. Hence, claims 1 and 18 do not meet the requirements of Article 6 PCT.

2. Independent claim 15 cannot be regarded as being a method claim, because it contains a substantial number of structural features rather than method steps. Claim 15 is therefore unclear in the sense of Article 6 PCT, too.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

(PCT Rule 44.1)

To:
APPLEYARD LEES
Attn. NEILL, Alastair W.
15 Clare Road
Halifax HX1 2HY
UNITED KINGDOM

	Date of mailing *(day/month/year)* 05/06/2000
Applicant's or agent's file reference RW/Q860	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/GB 00/ 00012	International filing date *(day/month/year)* 05/01/2000
Applicant TDS CAD GRAPHICS LIMITED et al.	

1. [X] The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Fascimile No.: (41–22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. [ ] **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

[ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

[ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

Within **19 months** from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within **20 months** from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL–2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Marja Brouwers

Form PCT/ISA/220 (July 1998)

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international pbulication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

(i) the claim is unchanged;

(ii) the claim is cancelled;

(iii) the claim is new;

(iv) the claim replaces one or more claims as filed;

(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."

2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."

3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."

4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international appplication is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference RW/Q860	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 00/00012	International filing date *(day/month/year)* 05/01/2000	(Earliest) Priority Date *(day/month/year)* 13/01/1999
Applicant TDS CAD GRAPHICS LIMITED et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 2

   [X] as suggested by the applicant.

   [ ] None of the figures.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

International Application No
PC[redacted] 00/00012

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F3/033 G09B5/06 G09B5/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F G09B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 195 35 119 A (DANDL FRIEDRICH) 27 March 1997 (1997-03-27) column 2, line 26 -column 4, line 21 figure 1	1-6,13, 15-21
A		8-12,14
X	US 5 176 520 A (HAMILTON ERIC R) 5 January 1993 (1993-01-05) column 5, line 1 -column 15, line 11 figure 1	1-3,6, 13,15, 19-21
A		4,8-11, 14,16-18

-/—

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 May 2000	05/06/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Baldan, M

2

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PC[redacted] 00/00012

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 279 558 A (OLIVETTI & CO SPA) 24 August 1988 (1988-08-24) column 1, line 46 -column 2, line 22 column 5, line 55 -column 14, line 22 figure 1	1,19,21
A	-----	2,16,20

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 00/00012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19535119 A	27-03-1997	NONE	
US 5176520 A	05-01-1993	CA 2040614 A	18-10-1991
		DE 69131816 D	05-01-2000
		EP 0479408 A	08-04-1992
EP 0279558 A	24-08-1988	IT 1207347 B	17-05-1989
		DE 3882547 A	02-09-1993

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
RW/0860		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/GB 00/ 00012	05/01/2000	13/01/1999
Applicant		
TDS CAD GRAPHICS LIMITED et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 2

   [X] as suggested by the applicant.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
[redacted]T/GB 00/00012

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F3/033 G09B5/06 G09B5/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F G09B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 195 35 119 A (DANDL FRIEDRICH) 27 March 1997 (1997-03-27) column 2, line 26 -column 4, line 21 figure 1	1-6,13, 15-21
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X	US 5 176 520 A (HAMILTON ERIC R) 5 January 1993 (1993-01-05) column 5, line 1 -column 15, line 11 figure 1	1-3,6, 13,15, 19-21
A		4,8-11, 14,16-18

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
26 May 2000	05/06/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Baldan, M

2

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International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 279 558 A (OLIVETTI & CO SPA) 24 August 1988 (1988-08-24) column 1, line 46 -column 2, line 22 column 5, line 55 -column 14, line 22 figure 1	1,19,21
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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		DE 69131816 D	05-01-2000
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